

## Spiders (Araneae) from Madagascar<sup>1)</sup>

Hirotsugu ONO<sup>2)</sup>

小野展嗣<sup>2)</sup>: マダガスカル産のクモ類

**Abstract** A small collection of spiders taken from Madagascar is systematically studied. The specimens are classified into 16 species of the families Nemesiidae, Tetragnathidae, Araneidae, Pisauridae, Oxyopidae, Ctenidae, Thomisidae and Salticidae, including three new species to be described under the names *Anahita isaloensis* (Ctenidae), *Diaea nakajimai* (Thomisidae) and *Hyllus bifasciatus* (Salticidae).

Madagascar has been known to abound in terrestrial animals of special interest. In arachnology, the discovery of archaeid spiders is a noteworthy example (MILLOT, 1947; LEGENDRE, 1970; PLATNICK, 1991). Through the classical works of VINSON (1863), BUTLER (1882), LENZ (1886, 1891), SIMON (1889), PECKHAM & PECKHAM (1903) and STRAND (1907, 1908) as well as the modern studies mainly made by European arachnologists, LEGENDRE (1970), EMERIT (1974), WANLESS (1978), BLANDIN (1979), GRASSHOFF (1984), and others, many species of spiders have been described from Madagascar. However, the greater part of these records was based on the relatively common spiders easily collected and the entire figure of the Malagasy spider fauna has not been given.

The present paper deals with the result of systematic study of the spider specimens obtained from Madagascar during the collaborative researches of Prof. T. NAKAJIMA, Tokyo University, and Prof. M. ANDRIANTSIFERANA, University of Antananarivo. The specimens were classified into 16 species of 8 families. Since the collecting was made in the field for a study in toxinology and medical sciences, the collection was composed of large and popular spiders and had no use for a faunistic purpose with the exception of three species of the families Ctenidae, Thomisidae and Salticidae new to the science. These new species will be described herewith.

All the type specimens of the new species are deposited in the collection of the National Science Museum, Tokyo.

The abbreviations used in the present paper are as follows: ALE, anterior la-

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2) Department of Zoology, National Science Museum, Tokyo 3-23-1 Hyakunin-cho, Shinjuku-ku, Tokyo, 169 Japan

国立科学博物館動物研究部 〒169 東京都新宿区百人町 3-23-1

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teral eye; AME, anterior median eye; PLE, posterior lateral eye; PME, posterior median eye. The distances between eyes are presented with a dash as AME-AME indicates distance between AMEs.

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#### Family Nemesiidae

##### *Entypesa nebulosa* SIMON, 1902

*Specimen examined.* 1♀, Antananarivo, 1,300 m alt., Madagascar, 23-XII-1992, T. NAKAJIMA *et al.* leg. (NSMT-Ar 3005).

*Distribution.* Madagascar.

#### Family Tetragnathidae

##### *Nephila inaurata madagascariensis* (VINSON, 1863), sensu SCHMIDT & JOCQUÉ, 1986

*Specimen examined.* 1♀, Antananarivo, 1,300 m alt., Madagascar, 23-XII-1992, T. NAKAJIMA *et al.* leg. (NSMT-Ar 3006).

*Distribution.* South Africa, Madagascar, Seychelle Islands.

##### *Nephilengys borbonica livida* (VINSON, 1863)

*Specimens examined.* 2♀, Antananarivo, 1,300 m alt., Madagascar, 23-XII-1992, T. NAKAJIMA *et al.* leg. (NSMT-Ar 3007).

*Distribution.* Madagascar, Comoro Islands.

#### Family Araneidae

##### *Cyrtophora citricola* (FORSKÅL, 1775)

*Specimens examined.* 2♀, Antananarivo, 1,300 m alt., Madagascar, 23-XII-1992, T. NAKAJIMA *et al.* leg.; 1♀, Farakaraina near Maroantsetra, 22-I-1993, M. KOMIYA leg.—(NSMT-Ar 3008-3009).

*Remark.* The specimen from Maroantsetra shows a variant form of abdomen which is blackish and has no tubercles.

*Distribution.* Tropical and temperate regions in the Old World.

##### *Caerostris mitralis* (VINSON, 1863)

*Specimen examined.* 1♀, Antananarivo, 1,300 m alt., Madagascar, 23-XII-1992, T. NAKAJIMA *et al.* leg. (NSMT-Ar 3010).

*Distribution.* Central Africa, Madagascar.

*Caerostris extrusa* BUTLER, 1882

*Specimens examined.* 3♀, Antananarivo, 1,300 m alt., Madagascar, 23–XII–1992, T. NAKAJIMA *et al.* leg.; 2♀, Analamazaotra Reserve, Andasibe, 30–31–I–1993, M. KOMIYA leg.; 1♀, Farakaraina near Maroantsetra, 22–I–1993, M. KOMIYA leg. —(NSMT–Ar 3011–3013).

*Distribution.* Madagascar.

*Caerostris sexcuspidata* (FABRICIUS, 1793)

*Specimens examined.* 2♀, Antananarivo, 1,300 m alt., Madagascar, 23–XII–1992, T. NAKAJIMA *et al.* leg. (NSMT–Ar 3014).

*Distribution.* Central, East and South Africa, Madagascar, Comoro Islands.

*Caerostris cowani* BUTLER, 1882

*Specimens examined.* 1♀, Analamazaotra Reserve, Andasibe, 30–31–I–1993, M. KOMIYA leg.; 1 juv. ♀, Antananarivo, 1,300 m alt., 23–XII–1992, T. NAKAJIMA *et al.* leg. —(NSMT–Ar 3015–3016).

*Distribution.* Madagascar.

*Acrosomoides acrosomoides* (O. PICKARD-CAMBRIDGE, 1879)

*Specimens examined.* 3♀, Antananarivo, 1,300 m alt., 23–XII–1992, T. NAKAJIMA *et al.* leg. (NSMT–Ar 3017).

*Distribution.* Madagascar.

*Gasteracantha rhomboidea madagascariensis* VINSON, 1862

*Specimen examined.* 1♀, Antananarivo, 1,300 m alt., 23–XII–1992, T. NAKAJIMA *et al.* leg. (NSMT–Ar 3018).

*Distribution.* Madagascar.

*Argiope coquereli* (VINSON, 1863)

*Specimen examined.* 1♀, Isalo National Park, 8–10–I–1993, M. KOMIYA leg. (NSMT–Ar 2021).

*Distribution.* Madagascar.

Family **Pisauridae**

*Paracladycnis vis* BLANDIN, 1979

*Specimen examined.* 1♀, Antananarivo, 1,300 m alt., 23–XII–1992, T. NAKAJIMA *et al.* leg. (NSMT–Ar 3019).

*Distribution.* Madagascar.

### Family Oxyopidae

*Peucetia lucasi* (VINSON, 1863)

*Specimen examined.* 1♀, Isalo National Park, 8–10–I–1993, M. KOMIYA leg. (NSMT–Ar 3020).

*Distribution.* East Africa, Madagascar.

### Family Ctenidae

*Anahita isaloensis* sp. nov.

(Figs. 1–5)

*Type specimen.* Holotype: ♂, Isalo National Park, Madagascar, 8–10–I–1993, M. KOMIYA leg. (NSMT–Ar 3023).

*Other specimen examined.* 1♂, same data as for the holotype (NSMT–Ar 3024).

*Description* (based on the holotype ♂; ♀ unknown). Measurement. Body length 13.11 mm; prosoma length 6.67 mm, width 5.28 mm; opisthosoma length 7.11 mm, width 3.89 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 25.05 mm (6.88+2.78+6.11+6.00+3.28), II 24.36 mm (6.49+2.78+5.77+6.10+3.22), III 22.91 mm (6.04+2.66+5.27+6.11+2.83), IV 29.41 mm (7.43+2.83+6.66+9.05+3.44).

Prosoma densely haired, median furrow distinct and straight; eyes in three rows,  $PME=PLE>AME>ALE$  (3: 3: 2: 1),  $AME-AME/AME$  0.88,  $PME-PME/PME$  0.33,  $PME-PME/PME-PLE$  0.57, median ocular area wider than long (length/width 0.96), wider behind than in front (anterior width/posterior width 0.68), ALE not visible from above, clypeus/AME 0.75. Promargin of fang furrow of chelicera with three teeth, the middle one larger, retromargin with two teeth; labium wider than long (length/width 0.83); sternum orbicular, slightly longer than wide (length/width 1.05). Spines of legs developed, tibiae I–IV with three pairs of ventral spines (2–2–2) respectively, metatarsi I–II with a pair of ventral spines (2–0–0). Tarsi and metatarsi with scopula; claw tuft developed, basal parts of the claws of legs strongly sclerotized.

Male palp (Figs. 2–3). Tibia with a retrolateral apophysis digitiform; tegular apophysis long and uncinat, embolus very long, filiform, and lying on the tegular ridge strongly sclerotized, membranous conductor present.

Coloration and markings (Fig. 1). Carapace light brown at the middle, both the sides darker with some pairs of black spots, wholly covered with short white hairs; chelicerae reddish brown, maxillae brown, labium brown, basally darker, sternum black; coxae black, other segments of legs yellowish brown and covered with white hairs. Opisthosoma dorsally dark yellow with a pair of blackish brown stripes, laterally beige, ventrally black.

*Remarks.* Though more than a hundred species of ctenid spiders were described from Africa (HYATT, 1954; BENOIT, 1974, 1977a, b, 1981, etc.), only a few reports have been made on those from Madagascar (LENZ, 1886, 1891; SIMON, 1889, 1897;

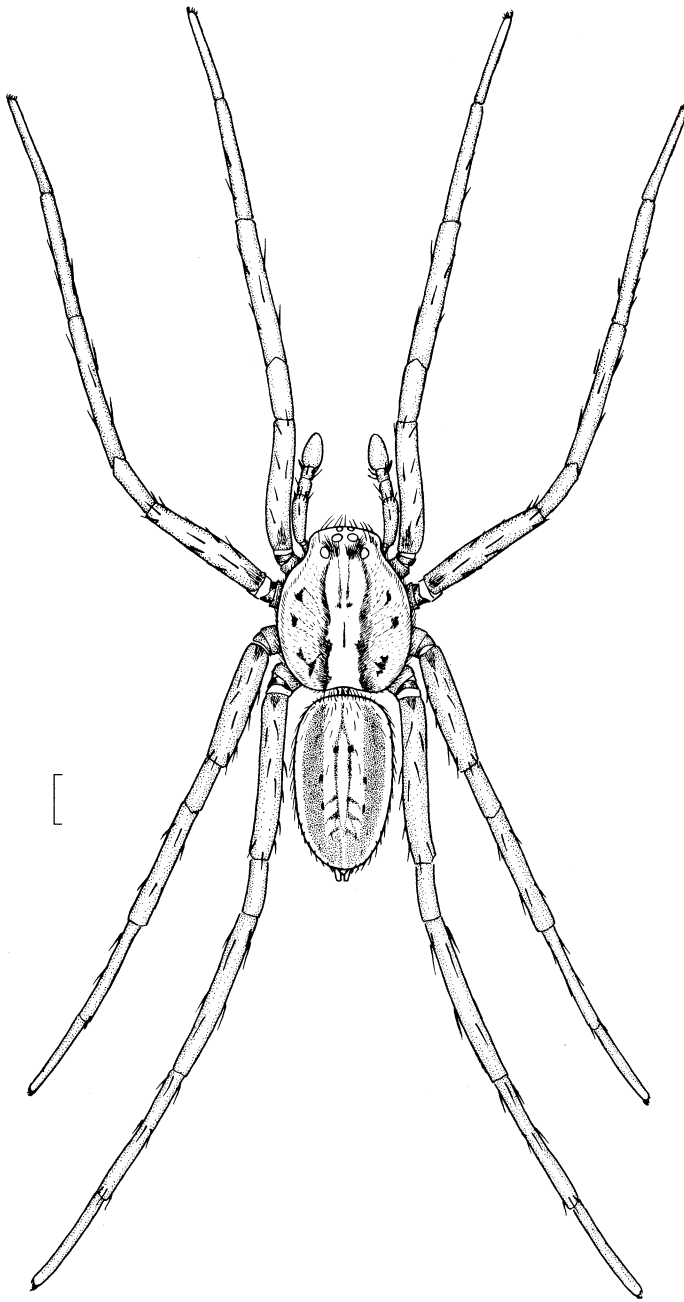
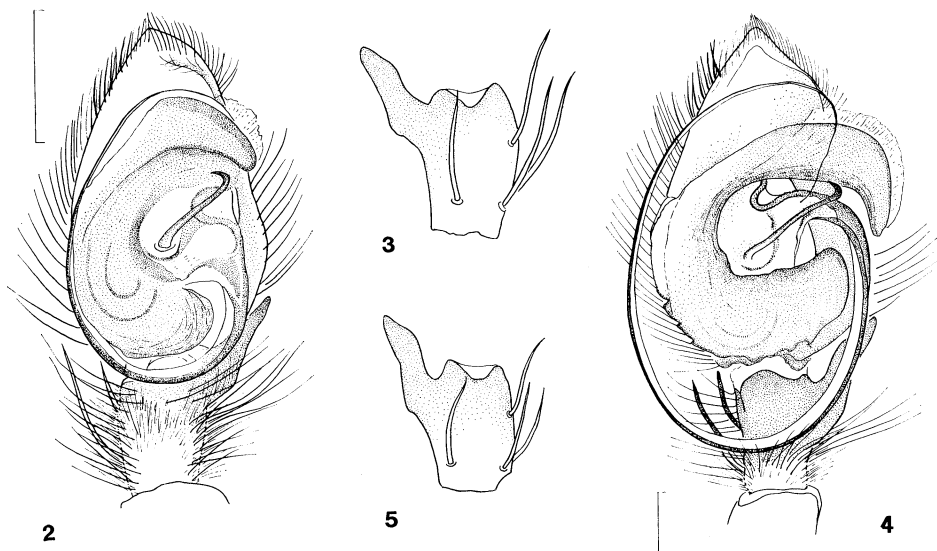


Fig. 1. *Anahita isaloensis* sp. nov., male holotype. (Scale: 2 mm.)



Figs. 2-5. *Anahita isaloensis* sp. nov.—2, 4, Male palps, ventral view; 3, 5, tibiae of male palp, dorsal view [2-3, holotype; 4-5, 1♂ variant]. (Scales: 1 mm.)

STRAND, 1907, 1908). The ctenid spiders recorded from Madagascar belong to unfamiliar genera, *Uliodon* L. KOCH, 1873, and *Vulsor* SIMON, 1888, both never revised with the modern systematics since the beginning of the 20th century. The new ctenid spider described herewith seems to belong to the genus *Anahita* KARSCH, 1879, originally designated with a Japanese species, *Anahita fauna*. It is a small genus containing two dozen species described from tropical regions of the world mainly from Africa. The dentition of chelicera and the arrangement of eyes of this new species are typical of the genus. However, the shape of tegular apophysis of male palp is so unique that the new species is readily distinguishable from the other congeners including *Anahita debilis* (PAVESI, 1895), *A. cambridgei* LESSERT, 1915, and the other species known from East Africa. A close relationship was not recognized between *A. isaloensis* and these African species.

Another male in the same collection shows extremely different body size and coloration from those of the holotype, therefore, it was not designated as a paratype. The body of the male is 21.78 mm long; the carapace is wholly brown and the dorsum of opisthosoma is yellowish brown mottled with dark brown and without stripes as the holotype. The sternum and the venter of opisthosoma are light yellowish brown, while those of the holotype are deep black. However, on the other features as well as on the construction of male palp (cf. Figs. 2 & 4, 3 & 5), no distinct difference was recognized to make another new species.

The specific name of the new species is derived from the type area.

## Family Thomisidae

*Diaea nakajimai* sp. nov.

(Figs. 6–8)

*Type specimen.* Holotype: ♂, Antananarivo, 1,300 m alt., Madagascar, 23–XII–1992, T. NAKAJIMA *et al.* leg. (NSMT–Ar 3025).

*Description* (based on the holotype ♂; ♀ unknown). *Measurement.* Body length 4.44 mm; prosoma length 1.93 mm, width 1.74 mm; opisthosoma length 2.44 mm, width 1.41 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 11.03 mm (3.04+1.04+3.11+2.62+1.22), II 10.55 mm (3.04+1.04+2.96+2.44+1.07), III 5.00 mm (1.63+0.63+1.26+0.96+0.52), IV 5.67 mm (1.85+0.60+1.52+1.11+0.59).

Prosoma longer than wide, with long setae. Tubercles of anterior and posterior lateral eyes developed and confluent; ALE>PLE>AME>PME (6: 4: 3.5: 3), ALE/AME 1.71, PLE/PME 1.33, AME–AME/AME–ALE 1.00, PME–PME/PME–PLE 0.57, median ocular area longer than wide (length/width 1.14), wider behind than in front (anterior width/posterior width 0.92), clypeus/AME–AME 1.42. Leg formula I–II–IV–III; claw tuft poorly developed; tarsal claws with 4–5 teeth.

Spiniformation of legs. Femora: I–IV dorsal 1–1–1–1–1, I prolateral 0–0–1–1–1, II prolateral 0–0–0–0–1; patellae: I–IV dorsal 1–0–1, I–II pro- and retrolateral, III–IV retrolateral each 1; tibiae: I–IV dorsal 1–1, I–II pro- and retrolateral each

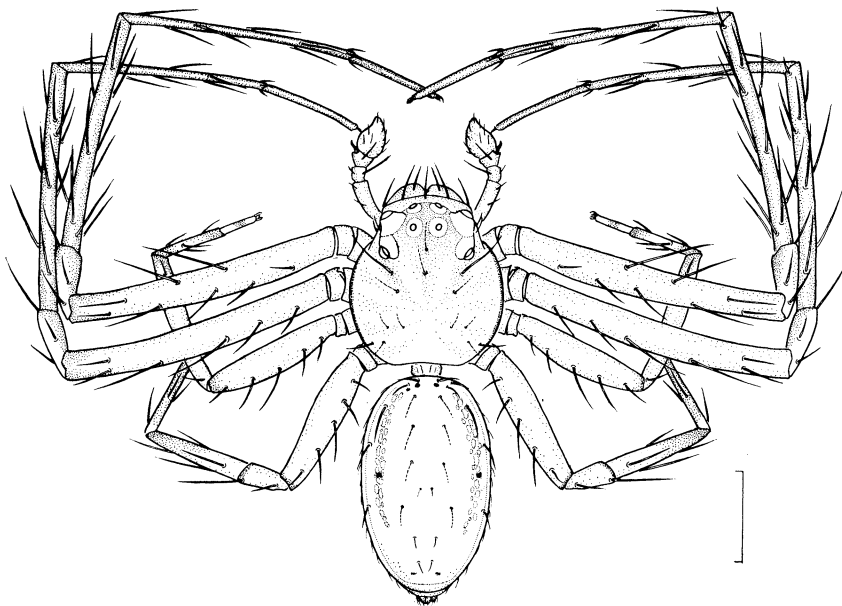
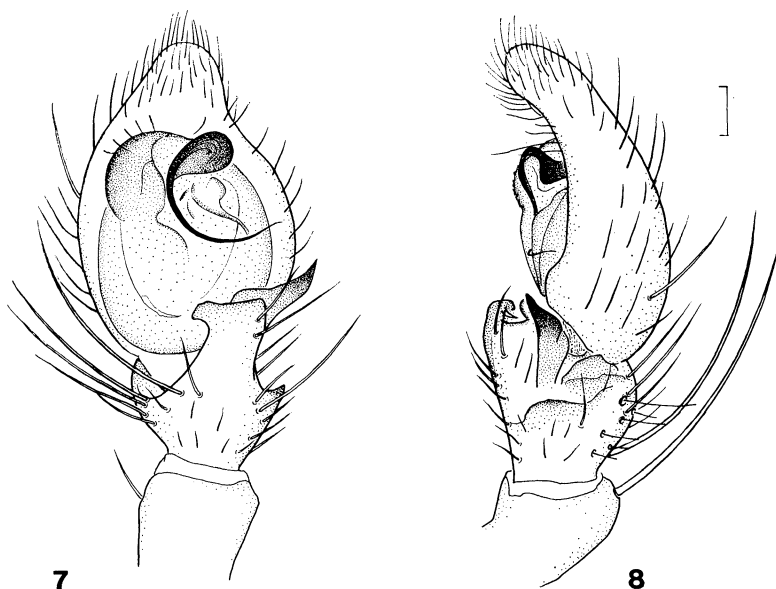


Fig. 6. *Diaea nakajimai* sp. nov., male holotype. (Scale: 1 mm.)



Figs. 7-8. *Diaea nakajimai* sp. nov.—7, Male palp, ventral view; 8, same, retrolateral view. (Scale: 0.1 mm.)

1-1-1, ventral 2-2-2, III-IV pro- and retrolateral 1-0-1, ventral 0-2-2; metatarsi: I-II prolateral 1-0-1-2 (apical), ventral 2-0-2, I retrolateral 1-1-2, II retrolateral 1-1-1, III-IV pro- and retrolateral each 1-0-1, ventral 2.

Male palp (Figs. 7-8). Tibia with ventral and retrolateral apophyses; ventral apophysis much developed and very wide; retrolateral apophysis strongly sclerotized and situated between ventral apophysis and sclerotized ridge. Basal part of embolus expanded; embolus short and thin, winding; apical part of embolus on sclerotized ridge of tegulum.

Coloration and markings (Fig. 6). Carapace light yellowish green, head white; chelicerae, maxillae, labium and sternum light yellow; legs: femora I-IV distally, patellae, tibiae, metatarsi and tarsi I-II wholly, patellae III-IV distally, distal half of tibiae III-IV, metatarsi III-IV wholly, tarsi at the middle respectively red, other parts light yellow. Opisthosoma dorsum light yellowish green with white spots, venter light yellow, spinnerets red.

*Remarks.* From Madagascar, no record of the genus *Diaea* was made up to the present, while more than ten species were described from Africa under the genus. This new species can be easily distinguished from these known species by the unique male palp with short and winding embolus and very large ventral tibial apophysis. *Diaea implicata* described from Ivory Coast by JÉZÉQUEL (1966) resembles this new species in having the male palp with a embolus unusually curved.

This new species is dedicated to Prof. T. NAKAJIMA, Tokyo.



## Family Salticidae

*Hyllus bifasciatus* sp. nov.

(Figs. 9–12)

*Type specimen.* Holotype: ♂, Antananarivo, 1,300 m alt., Madagascar, 23–XII–1992, T. NAKAJIMA *et al.* leg. (NSMT–Ar 3038).

*Description* (based on the holotype ♂; ♀ unknown). *Measurement.* Body length 8.77 mm; prosoma length 4.52 mm, width 3.48 mm; opisthosoma length 4.22 mm, width 3.19 mm; lengths of legs [total length (femur+patella+tibia+metatarsus+tarsus)]: I 10.53 mm (3.19+2.30+2.37+1.78+0.89), II 8.67 mm (2.67+1.78+1.81+1.56+0.85), III 9.48 mm (2.96+1.56+2.00+2.00+0.96), IV 8.12 mm (2.41+1.26+1.63+1.93+0.89).

Prosoma slightly longer than wide (length/width 1.30), both the lateral margins arched in dorsal view, ocular area wider than long, densely covered with hairs, length of ocular area less than 1/2 of prosoma length (in the ratio 0.45); the first row of eyes longer than the third, strongly recurved in frontal view, the second row slightly closer to the third than to the first (ALE–PME/PME–PLE 1.38); ALE larger than PLE (AME: ALE: PLE: PME=7: 4: 3.5: 1.5), AME–AME/AME–ALE 0.83, clypeus/AME 0.32. Chelicera short, posterior margin of fang furrow with a large tooth (Fig. 10); labium slightly longer than wide (length/width 1.13); sternum longer than wide (length/width 1.35). Leg formula I–III–II–IV, patella and tibia of leg III longer than those of leg IV.

*Spiniformation of legs.* Femora: I–II dorsal 0–0–1–1–1, prolateral 0–0–0–0–2, III dorsal 0–1–0–1–1, prolateral 0–0–0–0–2; patellae: II prolateral, III–IV retrolateral each 1; tibiae: I–II prolateral 1–0–1, ventral 2–2–2, III prolateral 0–1, III–IV retrolateral 1–1–0–1, ventral 1–0–2; metatarsi: I–II ventral 0–2–0–2, III pro- and retrolateral each 1–0–2 (apical), IV pro- and retrolateral each 1–1–2 (apical), III–IV ventral 2–0–2 (apical).

*Male palp* (Figs. 11–12). Tibia with a retrolateral apophysis sclerotized and apically pointed; bulb simply shaped, longer than wide, with a tegular apophysis digitiform; embolus filiform and simple.

*Coloration and markings* (Fig. 9). Prosoma blackish brown, lighter at the middle, ocular area black; chelicerae reddish brown, maxillae and labium yellowish brown, sternum dark yellow, legs brown, without rings. Opisthosoma dorsum black with two transverse bands yellowish brown, venter dark grey.

*Remarks.* About 80 species of the family Salticidae were recorded from Madagascar (PRÓSZYŃSKI, 1990). Of these, 10 species are the members of the genus *Hyllus* C. L. KOCH, 1846, that is, *H. albomarginatus* (LENZ, 1886), *H. albooculatus* (VINSON, 1863), *H. interrogationis* STRAND, 1907 (PRÓCHNIEWICZ, 1989), *H. lugubrellus* STRAND, 1908, *H. lugubris* (VINSON, 1863), *H. juanensis* STRAND, 1907, *H. madagascariensis* (VINSON, 1863), *H. nossibeensis* STRAND, 1907, *H. vinsoni* (PECKHAM *et* PECKHAM, 1885) and *H. virgillus* STRAND, 1907. These are relatively large-sized salticids characterized by the shape of carapace, the dentition of chelicera and the construction of the genital organs basically simple (WANLESS, 1983). WANLESS noted that the African species of *Hyllus* may not be congeneric with *H. giganteus* C. L. KOCH, 1846, the type species of the genus described from Malaysia and that the

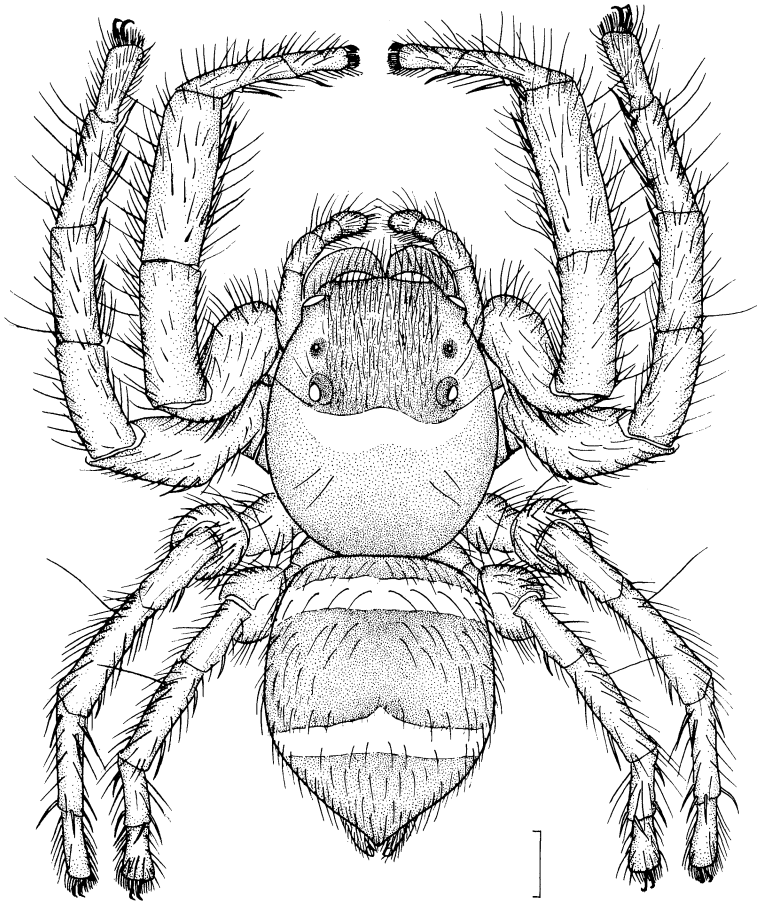


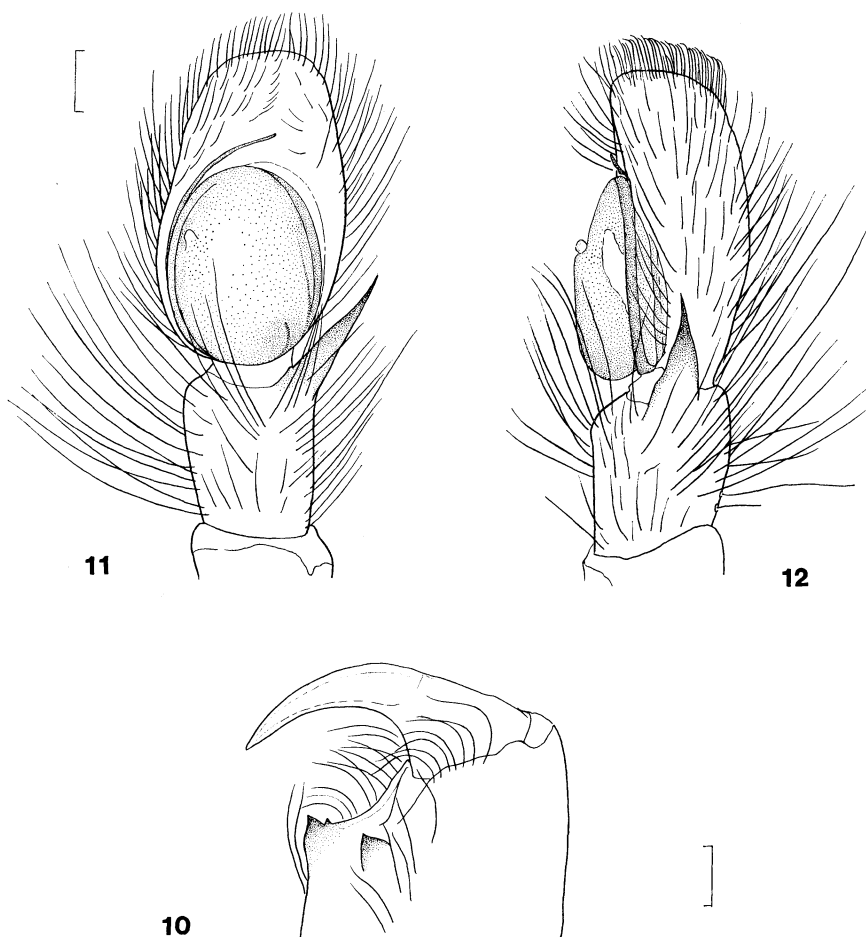
Fig. 9. *Hyllus bifasciatus* sp. nov., male holotype. (Scale: 1 mm.)

limits of the genus cannot be clearly defined.

Having remarkable transverse white bands on the opisthosoma, this new species can be readily distinguished from these species known from Madagascar. The structure of male palp of *H. bifasciatus* is much different from those of the known species especially in the shape of embolus and in the presence of tegular apophysis. In the basic construction of male palp, this new species has close resemblance to *H. guineensis* BERLAND et MILLOT, 1941, described from Guinea, West Africa.

#### 摘 要

マダガスカルで採集されたクモ類の標本を分類学的に研究した結果, Nemesiidae, Tetragnathidae, Araneidae, Pisauridae, Oxyopidae, Ctenidae, Thomisidae, Salticidae の 8 科に属する 16 種に同定された。そのうちシボグモ科, カニグモ科およびハエトリグモ



Figs. 10–12. *Hyllus bifasciatus* sp. nov.—10, Chelicera, ventral view; 11, male palp, ventral view; 12, same, retrolateral view. (Scales: 0.2 mm.)

科の3種は新種としてそれぞれ *Anahita isaloensis*, *Diaea nakajimai*, *Hyllus bifasciatus* の学名で記載した。

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